



COMPARISON OF STATIC AND DYNAMIC BALANCE PARAMETERS OF ATHLETES IN TENNIS AND BADMINTON SPORTS

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Abstract:

The purpose of this study is to compare static and dynamic balance characteristics of athletes in tennis and badminton branches. As the study group, 13 athletes playing tennis at the elite level at Istanbul Avrupa Yakası Tennis Club and 13 athletes engaged in badminton branch, 26 athletes in total, participated in our study voluntarily. Height, Weight, Body Mass Index, Static and Dynamic Balance measurements for volunteers were made. Data was recorded by the programme named SPSS 22.0. One-Sample Kolmogorov-Smirnov test was used for normal distribution of data. Unpaired t test was used for comparison between branches. The value of $p < 0.05$ was considered significant. No significant difference was found for parameters of age, height, weight, BMI, dynamic balance ($p > 0.05$) whereas a significant difference was found for the parameter of Static balance ($p < 0.05$). As a result, it was found that a number of physical and motoric characteristics of athletes engaged in tennis and badminton sports were similar. It is supposed that physical and motoric features which are not similar arise due to different field sizes and materials of different characteristics used in tennis and badminton sports.

Keywords: tennis, badminton, static balance, dynamic balance

1. Introduction

Sports have a strong dynamic which is shown great interest all over the world, by its millions of fans and practitioners. It has become, in many countries in the world and in our country, an indispensable element of life as it has been brought into schools and clubs. Sports have become the favourite pastime for the youth because its psychological, sociological and pedagogical values, as it improve group togetherness.

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Sports are a biological, pedagogical and social engagement which improves physical activity and motoric abilities, mental, spiritual and social behaviours of a person under certain arrangements and aims at racing these features under certain rules. Reaching large masses has taken sports beyond being a sole activity and also made it a fact by which material and moral success can be achieved (İnal 1998).

Sports are divided into two as mass and peak sports. Whereas mass sports is defined as sports in which people of every age can participate, peak sports is defined as kind of sports by which elite athletes meet their material and moral needs by practicing those sports. Racket sports, tennis and badminton branches that are mass and peak sports, have been approved by practitioners and fans, and become part of life, being brought into schools and clubs. Tennis and badminton of racket sports are both performance and mass sports in which all the world can participate in line with life-long sports principle (Aslan and Okumuş 2003 and Salman 2009). An athlete must show high performance in terms of physiological and motoric features for success in sports. Balance performance is one of the parameters to ensure this (Eliöz et al. 2013). Balance is an ability which generates a solution for unbalancing due particularly to change of center of gravity of the body. Balance is divided into static and dynamic. Whereas static balance is the ability of balancing the body in a certain point or position, dynamic balance is the ability of balancing the body while moving (Hazra and Taşmektepligil 2008).

Balance is an important factor that combines with sportive performance and physical suitability in daily life (Aksu, 1994). Balance is the ability of maintaining desired position of the body during movement. Upright position of the body is the basis for performing required movement in well-developed motoric activities (Bressel et al 2007). A person's ability to redress balance is an important factor for development of other motoric systems and for maintaining body composition necessary for successful performance in sports. It is stated that high level athletes exhibit balance control which develops in relation to requirements of each discipline (Caraffa et al, 1996). Elite athletes use precise sensory information dominantly in order to shape the posture according to requirements of their branches (Aksu, 1994; Bressel et al, 2007; Caraffa et al, 1996; Perrin et al, 1998).

The aim of this study is to make a comparison between static and dynamic balance characteristics of elite level athletes in tennis and badminton sports.

2. Method

13 athletes playing tennis at the elite level at Istanbul Avrupa Yakası Tennis Club and 13 athletes engaged in badminton branch, 26 athletes in total, participated in our study voluntarily. Height, Weight, Body Mass Index, Static and Dynamic Balance measurements for volunteers were made.

Height, body weight and balance performance of volunteers participating in the study were measured. Identity information was based on in determining ages of

athletes. Height was measured; in barefoot, head held high, head in Frankfort plane, measurement table corresponding to vertex of the head; following a deep inspiration, distance between vertex of the head and the sole was measured with Rodi Super Quality brand metre with 1 mm sensitivity and it was recorded in cm. Body weight measurement; athletes were weighed with their standard sporting clothes (t-shirt and shorts) with a 100 gr margin of error with premier brand electronic bascule and results were recorded in kg. Body mass index (BMI); was calculated using body weights and heights of test subjects in the formula of $BMI = \text{body weight (kg)} / \text{height (m}^2\text{)}$.

Static balance performance was measured using Flamingo Balance Test (FBT). Subjects balanced on a 50 cm long, 4 cm high and 3 cm wide wooden balancing equipment. They flexed the other leg at the knee, pulled towards the hip and held it with the hand on the same side. While the research group was on balance on one leg in this way, time started and they tried to remain in balance in this position for one minute. Time was stopped when balance was lost. Time was resumed when research group redressed the balance again by stepping on the balancing equipment. The test was continued in this way for one minute. When the time was over, each balancing attempt of the subject was counted and the number was recorded as test result (Şipal, 1989).

Johnson Modification of the Bass Test of Dynamic Balance was applied for determining dynamic balance performance. In this test, points were marked with 3x3 tapes. The subject standing by on right foot at the starting point hopped towards mark number 1 and fell onto the mark on left foot. The feet completely stepped on the points. The subject remained in balance here (on one leg) as long as possible (around 5 sec). Then the subject jumped to the next mark on the other foot, repeating the same setup. It was continued in this way till the end. As per scoring, 5 points are awarded for each successful landing on the marking tape. 1 point for each second in balance, maximum 5 points. Assessment is made over 10 points for each mark and 100 points in total. 5 points are not awarded for each faulty landing. Faulty landing; 1) failing to stand on marking tape 2) receiving support by the body from surface of any other part of it 3) failing to close the mark with the sole. If landed faulty, the subject continues to stand in balance for 5-second balance by maintaining correct position (Başöz et al. 1999).

3. Findings

Findings of the study are included in this section.

Table 1: Distribution of Physical Characteristics of Badminton and Tennis Players Who Participated in the Study

| Variables | Group | n | X | SS | t | P |
|-----------|-----------|----|--------|-------|--------|-------|
| Age | Badminton | 13 | 21,75 | 1,28 | -1,602 | 0,242 |
| | Tennis | 13 | 20,50 | 1,85 | | |
| Height | Badminton | 13 | 175,83 | 8,90 | -,243 | 0,709 |
| | Tennis | 13 | 176,71 | 8,66 | | |
| Weight | Badminton | 13 | 67,25 | 11,70 | 0,598 | 0,493 |
| | Tennis | 13 | 64,26 | 12,01 | | |
| BMI | Badminton | 13 | 23,56 | 2,08 | 1,298 | 0,184 |
| | Tennis | 13 | 22,58 | 2,30 | | |

In Table 1, distribution pertaining to physical characteristics of badminton and tennis players who participated in the study is given. According to data obtained, statistically significant difference was not found in age, height, weight and body mass index parameters of the volunteers ($p>0,05$).

Table 2: Distribution of Static and Dynamic Balance Parameters of Badminton and Tennis Players Who Participated in the Study

| Variables | Group | n | X | SS | t | P |
|-----------------|-----------|----|-------|------|-------|--------|
| Static Balance | Badminton | 13 | 8,01 | 1,53 | 2,158 | 0,039* |
| | Tennis | 13 | 7,09 | 1,18 | | |
| Dynamic Balance | Badminton | 13 | 79,36 | 5,62 | -,596 | ,457 |
| | Tennis | 13 | 78,54 | 5,12 | | |

As seen in Table 2, a statistically significant difference was found ($p<0,05$) in static balance parameter of badminton and tennis players who participated in the study whereas no significant difference was found in dynamic balance parameter ($p>0,05$).

4. Discussion and Conclusion

A number of differences were found as a result of this study which was conducted in order to compare anthropometric structures and basic motoric characteristics of athletes in badminton and tennis branches of racket sports which are similar in terms of physical and basic motoric characteristics. Age, height, weight averages of Badminton and Tennis players who participated in the study were found as $21,75\pm1,28$ years, $175,83\pm8,90$ cm, $67,25\pm11,70$ kg and $20,50\pm1,85$ years, $176,71\pm8,66$ cm $64,26\pm12,01$ kg, respectively. Statistically significant difference was not found in age, height and body weight parameters of tennis and badminton players who participated in the study ($p>0,05$). Koç et al. (2006) find age, height, weight averages of tennis players as 22.9 ± 2.6 years, 179 ± 1 cm, 73.9 ± 4.7 kg respectively, in their study (Koç et al). Arslanoğlu et al. (2009) find, in their study on Tarım Kredi Sports Club and Gazi University Badminton Club, age, height, weight averages of high level badminton players as $22,16 \pm 4,80$ years, $182,75 \pm 6,42$ cm, $74,16 \pm 8,21$ kg, respectively (Arslanoğlu et al. 2009). As

supported by sports scientists, becoming successful in a desired sports branch today is possible with bearing anthropometric suitability required by that branch of sports. Height, body weight and ages and sport ages of athletes are important for them to reach high level of sportive efficiency (Yalçiner, 1993 and Gelen et al 2009). It is supposed that the reason for finding no statistically significant difference as per age is that the volunteers were of the same age group athletes, as per height the reason is that these two sports branches consist of athletes of similar physical characteristics and as per body weight the reason is that training models and energy systems applied in both branches are similar.

BMI values for Tennis and Badminton players who participated in the study were found to be $23,56 \pm 2,08$ and $22,58 \pm 2,30$ kg/m², respectively. In statistical analysis, a statistically significant difference was not found in BMI parameter between these two branches. While Arslanoğlu et al. (2009) find BMI value of badminton players as $22,16 \pm 1,60$ kg/m² in their study, Koç et al. (2006) find in their study BMI value of tennis players as $23,2 \pm 1,4$ kg/m². In another study by Cerrah et al. on football players playing in super amateur league, BMI values are determined as $23,2 \pm 2,2$ for goalkeepers, $23,8 \pm 1,4$ for defenders, $22,9 \pm 2,0$ for midfielders and $23,6 \pm 1,5$ for strikers (Cerrah et al 2011). It is indicated in the literature that Body Mass Index is calculated by the formula where body weight in kg is divided by square of height in meters (Tamer, 2000).

Since no significant difference was found in height and body weight parameters of groups, BMI values do not bear significant differences, either. It is supposed that similarity in physical profiles of badminton and tennis players are due to similarities in structural characteristics caused by talent audition related to these branches and long-time trainings. When dynamic balance values of the volunteers who participated in the study were analyzed, they were determined as $79,36 \pm 5,62$ piece/minute for Badminton players and $78,54 \pm 5,12$ piece/minute for tennis players. Significant difference was not found in dynamic balance parameter ($p > 0,05$). (Sitti 2013) maintains in his/her study that Samson (2005) 5-week abdominal balance training is an important component of dynamic balance for tennis players. Although significant difference was not found in dynamic balance parameter in the study, it was observed that dynamic balance value of tennis players was better than that of badminton players. In this study, static balance value of badminton players was determined as $8,01 \pm 1,53$ piece/minute whereas it was found as $7,09 \pm 1,18$ piece/minute for tennis players. A significant difference was found in static balance parameter of badminton and tennis players who participated in the study ($p < 0,05$). Perrin et al. compare static balance test performance among judo, dance and control group. They indicate that judoists show higher performance than dancers (Perrin et al 1998). When we analyze studies on balance in different branches of sports, it is determined in the study of Erkmén et al. that balance performance of gymnasts is higher than that of basketball players (Erkmén et al. 2007). Yaggie and Armstrong state in their study on 36 people of ages of 20-25 that balance is an indicative factor for performance in talent audition after two weeks of balance exercises (Yaggie et al. 2004).

It is stated that balance, of techno motoric features, is one of the prerequisites which are important for selection and improvement of athletes (Sevim, 2007).

In conclusion, it was found that some of physical and selected motoric characteristics of athletes engaged in Tennis and Badminton were similar. It is supposed that differences between features which are not similar arise from different field sizes and materials of different nature used in tennis and badminton sports.

References

1. İnal A. N. Beden Eğitimi Ve Spor Bilimlerine Giriş, Selçuk Üniversitesi Beden Eğitimi ve Spor Yüksekokulu Yayınları,1998:5
2. Aslan M. F., Okumuş Y., Tenis ile ilgilenen sporcuların sosyo ekonomik özellikleri., Raket Sporları Sempozyumu 31 Ekim-1 Kasım 2003
3. Salman N.M., Badmintonda clear vuruş tekniğinin öğretiminde farklı uygulamaların performenasi üzerindeki etkilerinin incelenmesi 4. Raket Sporları Sempozyumu Kocaeli 11-12 Aralık 2009:7
4. Eliöz M., Sitti S., Koç M. C. Murt Z., Koç H. (2013). A Study on Static Balance Performance of Healthy and Hearing - Impaired Football Players. European Journal of Applied Sciences, 5: 25-28.)
5. Hazra F., Taşmektepligil Y. (2008). Puberte Öncesi Dönemde Denge ve Esnekliğin Çeviklik Üzerine Etkilerinin İncelenmesi, SPORMETRE Beden Eğitimi ve Spor Bilimleri Dergisi, 6: 9-12.)
6. Aksu, S. (1994). Denge Eğitiminin Etkilerinin Postüral Stres Testi İle Değerlendirilmesi. Hacettepe Üniversitesi Sağlık Bilimleri Enstitüsü Bilim Uzmanlığı Tezi, Ankara).
7. Bressel, E., Yonker, J. C., Kras, J., Heath, E. M. (2007). Comparison of Static and Dynamic Balance in Female Collegiate Soccer, Basketball, and Gymnastics Athletes. Journal of Athletic Training. 42: 42–46).
8. Caraffa, A., Cerulli, G., Projetti, M., Aisa, G., Rizzo, A. (1996). Prevention of anterior cruciate ligament injuries in soccer: a prospective controlled study of proprioceptive training. Knee Surg Sports Traumatol Arthrosc. 4: 19–21).
9. Perrin, P., Schneider, D., Deviterne, D., Perrot, C., Constantinescu, L., (1998). Training Improves The Adaptation to Changing Visual Conditions in Maintaining Human Posture Control in A Test of Sinusoidal Oscillation of The Support, Neurosci Lett, 245, 155–158.)
10. Şipal M. C., (1989). Eurofit Bedensel Yetenek Testleri El Kitabı. T.C. Başbakanlık G.S.G.M Dış İlişkiler Dairesi Başkanlığı Yayını, Yayın No 78. Ankara.
11. Başöz G., Odabaş İ., Pınar S. Çocuklarda Akademik Başarı ile Denge Becerisi Arasındaki İlişki, Spor Araştırmaları Dergisi Cilt 3 Sayı 3 Aralık 1999: 19)

12. Koç H., Kaya M., Sarıtaş N., Çoksevim B. Futbolcularda ve Tenisçilerde Bazı Fiziksel ve Fizyolojik Parametrelerin İncelenmesi, Sağlık Bilimleri Dergisi (Journal of Health Sciences) 2006;15(3):161
13. Arslanoğlu E., Aydoğmuş M., Arslanoğlu C., Şenel Ö. Badmintoncularda Reaksiyon Zamanı ve Denge İlişkisi, 4. Raket Sporları Sempozyumu 11-12 Aralık 2009 Kocaeli)
14. Yalçın M. (1993), Süratın Mekanik ve Fizyolojik Özellikleri. Başbakanlık GSGM Yayınları, Ankara
15. Gelen E., Mengütay S., Karahan M. Teniste servis performansını belirleyen fiziksel uygunluk ve biyomekaniksel faktörlerin incelenmesi. Uluslar arası İnsan Bilimleri Dergisi Cilt:6 Sayı:2 Yıl:2009
16. Cerrah A. O., Polat C., Ertan H. Süper Amatör Lig Futbolcularının Mevkilerine Göre Bazı Fiziksel ve Teknik Parametrelerini İncelenmesi Niğde Üniversitesi Beden Eğitimi Ve Spor Bilimleri Dergisi Cilt 5, Sayı 1, 2011: 1-7)
17. Tamer K. Sporda Fizyolojik Fiziksel Performansın Ölçülmesi ve Değerlendirilmesi 2. Baskı, Ankara: BağırhanYayınevi 2000;32-34).
18. Sitti S. Kış sporlarında Seçilmiş Branşlardaki Sporcuların Statik ve Dinamik Denge Performanslarının Karşılaştırılması, Erciyes Üniversitesi Beden Eğitimi ve Spor Bilimleri Anabilim Dalı, Yayınlanmamış Yüksek lisans Tezi 2013:40)
19. Erkmen N., Suveren S., Göktepe A. S., Yazıcıoğlu K. Sporcuların Egzersiz Sonrası Denge Performanslarının Karşılaştırılması, Egzersiz Çevrimiçi Dergi, 2007: 1: 2).
20. Yaggie J. A., Armstrong WJ. Effects of Lower Extremity Fatigue on Indices of Balance, J Sport Rehabil. 2004;13:312-322).
21. Sevim Y. Antrenman Bilgisi Nobel yayınları no: 358 2007:19-26,37, 240,286

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